

If a building is properly oriented and the skylights are properly specified and located, the sun can "light the fire", that is, "jump-start" the air movement. As the air in the building is warmed it expands. Warm air absorbs and holds more moisture than cooler air. Properly designed and placed vents in or near the ridge expel the moisture-laden air. Because this air has left the building, it creates a negative inside air-pressure. A suction action automatically brings in cooler and cleaner replacement air in controlled amounts, through low in- vents, or through the floor.

Another solution in hot, humid climates: a skylight dome admitting shaded light, set on louvers on a curb. Part of the breeze blowing across this skylight goes in the louvers on one side, and out the other side. Another part of the breeze goes over the curved dome and must go faster to keep up. This creates a positive pressure over the curved skylight and a negative pressure in the space under the louvers. This results in interior air being sucked up and vented out the louvers. This Bernoulli effect continues as long as there is any breeze and can vent air from a building even when the sun is not shining.

Now for three examples of these principals at work. Each building has inside and outside temperature, as well as inside and outside humidity documented by data loggers. The collected data is printed out from a computer in color, for easy reading. Each building also is compared with a "control" building located in the same area, and used for a similar purpose. Temperature is shown in red, relative humidity in blue. In each building the wild swings in temperature and humidity are smoothed out.

The first building is a combined office and home at the Volcano Golf Course, Ka'u. The glass atrium is a heat collector. The two sides face East and West. In the winter heat is needed, but in the summer only enough heat is needed to create the Delta T necessary to get the air moving. The West side is shaded in the summer. With the air warmed and wanting to get out, it moves to the high vents in the wings on either side of the atrium. In this way those wings of the building are heated. Four high vents in each building pod are open in the summer, only two are left open in the winter. As the air is warmed it absorbs moisture. Both warm air and moisture are vented. Closets have no ceilings. Many walls are eight feet or less in height, facilitating free air movement. There is no mildew and the paper for the Xerox machine works all the time. Three kitchen drawers are vented from below, the cool intake air keeping contents between 60 and 70 degrees. This is perfect storage for red wine, bread and some vegetables.

The second building is a home/office at about the 3,000 ft. elevation just off the Volcano Highway. Rainfall averages about 270 inches a year. The area is part of a native fern and ohia rain forest. Seldom is there a really sunny day. In spite of this, skylights on the east and south sides of each roof transform the interior into a bright,